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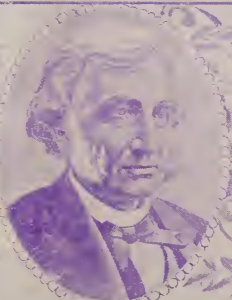
Vol. IV.

JANUARY, 1898.

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THE AGRICULTURAL STUDENT



J.S. MORRILL



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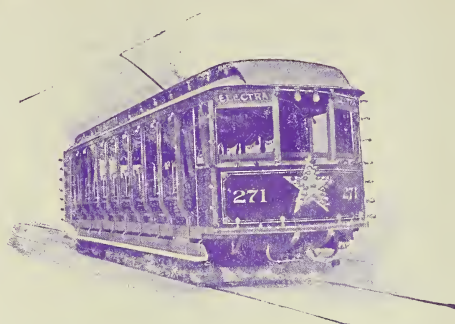
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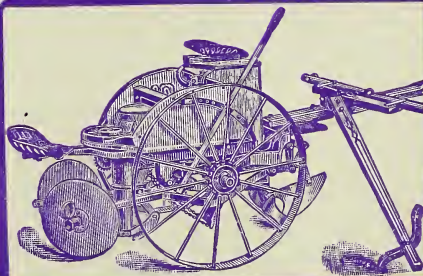
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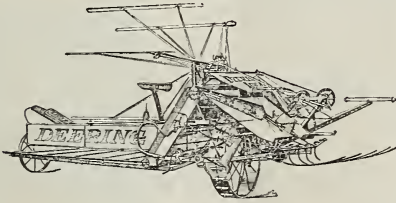
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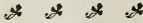
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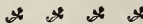


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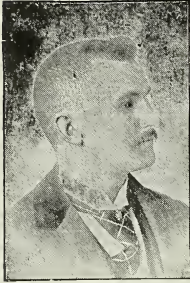
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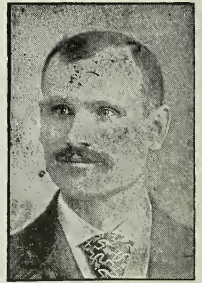
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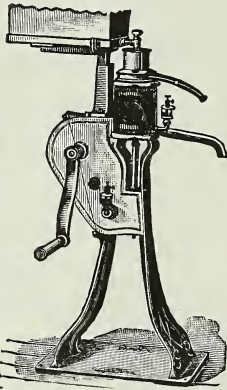
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J. M. Bradford
1897

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EDITORIAL CHAT.

With the discussion concerning the teaching of agriculture in the common schools arises the question as to the proper place to begin to teach the child the first principles of the science.

Should the child be plunged into the subject with no preliminary preparation or should there be an elementary course of studies leading up to the study of the main subject?

Well, let us think a moment. The science of agriculture is a combination of all of the natural sciences. To be well versed in agriculture in all its phases one should be well versed in the sciences that constitute it. Just as the engineer spends much time in his mathematics that will enable him to solve the higher problems when he reaches them, so must the scientific farmer begin by mastering the elements of the sciences that make up his greater science.

Begin then by instilling into the mind of the child a love of life and nature, and an interest in all living growing things. Explain the homely phenomena that are occurring every hour about us. Above all, train him to observe and think. When the child becomes able to observe and explain the many phenomena of nature he has the proper foundation upon which to base the study of scientific agriculture and all allied subjects.

The postal savings bank system is being widely advertised and discussed by the CHICAGO RECORD. That this system is a good one and is a benefit, we may say a blessing, to the nation adopting it, is attested by the European nations who have proved it to be a successful way of aiding saving, especially among the working classes.

The postal savings bank is a new thing in this country and might be considered as a reform in banking. Concerning the plan in this connection, Mr. Victor F. Lawson, of the paper mentioned above, writes thus:

"Public spirited newspapers frequently find it in the line of their duty to advocate desirable reforms which the people are not ready to accept because they have not yet recognized the need of them. It is a pleasure as well as a duty, therefore, for such newspapers to aid the people in securing a great reform for which they are prepared and eager.

"During the last few years all classes of citizens—the poor, the well-to-do, even the rich—have been brought to recognize the necessity for the establishment of an absolutely secure depository for small savings. Thousands of thrifty persons whose earning power is restricted have experienced the bitterness coming from loss of their hard-earned savings, through failure of savings banks, building and loan associations and other institutions which were supposed to give

safety to the sums entrusted to them. The suffering and despair which have resulted from such failures have been felt in every community. Hopelessness and doubt have been sown broadcast by these calamities, and the harvest of improvidence which is growing up will render this nation poor indeed unless that growth can be checked.

"Postal savings banks are certain to be established at an early day by the United States government. All who desire to assist in securing this great reform have here a splendid opportunity for patriotic service beneficial to the people and the nation."

Columbus Horticultural Society.

The Columbus Horticultural Society held its annual meeting in the lecture room of Botanical Hall, on Saturday, December 18th, at 2:00 p.m. It being the annual meeting the reports of all standing committees were called for. The reports made were quite interesting and valuable. The first paper of the meeting was read by Professor Lageman upon the subject "The Origin of the Christmas Tree." In this paper a history of Christmas celebration was given and the ancient customs at Christmas-tide were discussed.

The major paper was then read by Mr. Charles P. Fox, upon "The Physical Properties of Nuts." This paper was a compilation of the results of work done in the Horticultural Laboratory under Professor Lazenby. The paper is published elsewhere in this issue of The Student. After the discussion of this paper was closed the society proceeded to elect officers for the ensuing year. The following were elected:

President—William R. Lazenby.

Vice President—H. M. Sessions.

Secretary—John F. Cunningham.

Treasurer—George W. Sinks.

Chairmen of Standing Committees were elected as follows:

Botany—Prof. McFadden.

Vegetable Pathology—Prof. Kellerman.

Entomology—Prof. Kellicott.

Meteorology—Prof. Lazenby.

Library—J. J. Janney.

Fruits—O. W. Aldrich.

Plants and Flowers—W. R. Beattie.

Vegetables—Prof. Hunt.

Ohio State Academy of Science.

The seventh annual meeting of the Ohio State Academy of Science was held at the Ohio State University, Orton Hall, on December 28th and 29th, 1897, Professor W. A. Kellerman presiding. The Society now has about two hundred members, twenty names being presented at this meeting.

The first paper was by R. J. Webb, on "The Fertilization of the Closed Gentian." Professor D. S. Kellicott reported on additions to the Odonata of Ohio. The list Dragon-flies taken in Ohio now numbers ninety-seven.

E. W. Vickers gave three papers on the "Pileated Woodpecker in Mahoning County," "Pickering's Hylodes in Ohio" and "The Least Weasel in Ohio."

Edward Claassen reported briefly on the following subjects: Occurrence of the Long-Leafed Willow, Abnormalities in Plants, List of Liverworts of Cuyahoga and other counties of northern Ohio, List of Plants new to the flora of Ohio, and Erratic Boulders in the Valley of Rocky River.

Professor W. A. Kellerman gave the President's address on the subject, "Does Modern Science Furnish an Adequate Philosophy of Life." Dr. Kellerman also reported on the distribution of the Green Ash in Ohio, *Ustilago reiliana*, Spermatophyta, rare or new to the Ohio flora, and Revision of the Catalogue of Ohio Plants.

Professor F. M. Webster spoke on "Some Additions to the Known Insect Fauna of Ohio."

R. C. Osburn and E. B. Williamson gave a description of a new species of

fish—*Etheostoma sciotoensis*, Osburn and Williamson, a full description of which will appear in the proceedings of the Society. They also gave a list of sixty-nine species of fish for Franklin county, Ohio, and a list of the crayfish of Ohio.

J. H. Shaffner read papers on "Atavism in *Citrullus Vulgaris*," "Notes on the Salt Marsh Plants of Northern Kansas" and "Observations on the Nutation of *Helianthus Annuus*."

Other papers were:

"Notes on the Prehistoric Geology in the Vicinity of Devil's Lake, Wisconsin, and Dynamical Modifications of Quartzite," J. A. Bownocker.

"Science for the First Year of the High school course," and "Additions to the List of Ohio Fungi," F. L. Stevens.

"Science in the Country School," E. E. Masterman. "Cell Division in the Pine," E. L. Fullmer. "Embryology of a Dicotyl," Miss L. C. Riddle. "Dissection of a Double Trillium," Mrs. W. A. Kellerman. "Additions to the List of Plants of Ohio," "Reversion of Leaves to Loments in Tick-trefoil," "Evidence as to the Origin of Islands in Lake Erie," E. L. Moseley.

"The Junction of the Blue and Yellow Clays in the Drift of Northern Ohio," and "Recent Beaches at Sandusky Bay and Sodus Bay," A. A. Wright.

"A List of the Butterflies in Ohio" (ninety-seven in number), J. S. Hine.

"The Jonathan Creek Drainage Basin," H. J. Davis.

"The Preglacial Drainage of Knox County," W. G. Tight.

"Preglacial Drainage in the Vicinity of Cincinnati," "The Ohio River the Result of Glacial Conditions" and "No Evidence of an Ice-dam at Cincinnati," Gerard Fowke.

"Some New Points on Fine Attachment of *Dinichthys* and *Cladodus*," William Clark.

"Four Critical Points in the Valley of the Cuyahoga River," E. W. Claypoole.

The following officers were elected for the ensuing year:

President, G. W. Tight, Granville.

Vice Presidents, Joshua Lindahl, Cincinnati; J. H. Todd, Wooster.

Secretary, E. L. Moseley, Sandusky.

Treasurer, D. S. Kellicott, Columbus.

Executive Committee, Mary E. Hart, Oxford; E. W. Vickers, Ellsworth.

Member Publication Committee, Dr. S. Belle Craver, Toledo.

At this meeting Messrs. E. B. Williamson, J. B. Parker, John F. Cunningham and J. H. Shaffner, of the University, were elected to membership.

RAYMOND C. OSBURN

Where to Plant Nut Trees.

At the last meeting of the Columbus Horticultural Society, after briefly describing the most important nut fruits that may be grown in Ohio, Prof. W. R. Lazenby spoke substantially as follows regarding the planting of nut trees:

"It seems to me that our 'nut trees' might often be planted along roadsides, farm lanes, fence rows and odd corners of the farm.

Upon almost every farm there is more or less waste land which often is well adapted to certain varieties of nut trees. Among the varieties which can be used for this purpose in the state of Ohio may be mentioned the black walnut, the butternut, the American chestnut, the shagbark hickory, and in the southern part of the state, the pecan. The hazel nut may also be included in the above list.

"The black walnut and butternut may be grown in almost any deep, rich, moist soil. They have each quite a wide range and thrive in almost any good soil that is not too dry. The walnut is more common in the south and west, the butternut in the north and east. The chestnut has a somewhat narrower range, but succeeds well on sandstone ridges and in soils that contain little or no lime. The chestnut varies greatly in the size and

quality of its fruit and the best nuts from the most productive trees should always be selected for planting. The Spanish, Italian and Japanese chestnut may be grafted upon our native stock with good success.

The shag, or shell-bark hickory is less particular in its soil requirements than the nut trees already mentioned. It is found on sandy ridges, clay hillsides and rich, low lands. It is a tree that delights in a shade of underbrush, but grows well in open groves. The nuts from this tree are extremely variable in size and quality. Only the large, thin-shelled, sweet-kernelled varieties should be selected for planting. The pecan is a southwestern species. Its eastern limit is central Kentucky, and northern limit a little north of the Ohio river. It is believed by some that it may be successfully cultivated wherever the peach is grown. We know that in some sheltered areas it has been successfully grown much farther north than its native habitat.

"As a rule the nut trees are best grown by planting sprouted nuts where the trees are to stand. They will require some nursing and protection for the first few years, but will soon take care of themselves. It should never be forgotten, if we are after fruit rather than timber, that our nut trees should be encouraged to branch low and form wide-spreading, open heads, admitting light freely. For timber we should plant closely so as to form a tall, straight trunk. There may be no great promise of profit in nut culture, yet I am certain that a little well-directed labor in this direction can scarcely fail to return equal pleasure and satisfaction."

Physical Properties of Nuts.

At the last meeting of the Columbus Horticulture Society Mr. C. P. Fox spoke as follows concerning the physical properties of nuts:

Christmas time brings feasts of candy and nuts. With the exception of the peanut, nuts are not used in this country

to any great extent at other seasons of the year. Their use as a desert fruit is limited and they are considered more in the nature of a luxury than a necessity. The great interest manifested in food reform will soon result in a general use of a balanced ration for the human stomach. These changes in our present methods of feeding may lead to the use of more nuts, especially where a vegetable diet is desired. The majority of our vegetable foods are deficient in fat. Nuts excel in fat. The kernel of the black walnut contains 49 per cent., the butternut 61 per cent., and the American chestnut 17 per cent. From these figures it will be seen that a few ounces of kernels will supply the requisite amount of fat required by the daily ration. Concerning the chemical composition of nuts, I will speak at another time. At present I will deal with the physical features or characters of some of our common nuts. The term nut is used in its commercial sense rather than the botanical. The list, therefore, includes all of the so-called nuts excepting the cocoanut, beech nut and pine nut. The cocoanut is used more for the purpose of confection than for eating from the hand. The beech and hazel nuts could not be obtained and the pine is found only on the western markets. By means of these diagrams and figures the difference between the nuts may be readily seen. It might be interesting to add that these figures are the results of some tests made in Horticultural Laboratory of the University by the class in Pomology under Professor Lazenby.

The first examination was to determine the number of nuts in a pound of the various kinds. The largest numbers are found with the peanut, filbert and American chestnut. The largest numbers are represented by the walnuts, large hickory nuts and foreign chestnuts. Attention is called to the wide difference between the large hickory and the shell-bark. There is also quite a difference between the types of

the large hickory nuts. The large, flat nut, "type A," run only 39 to a pound, while "type B," contains 54. The percentage of shell in the two varieties is the same.

The second examination was designed to show the percentage of kernel. The highest is 87 per cent. in the Spanish chestnut. The second highest is 75 per cent. in the American chestnut. This is followed closely by the peanut, containing 72 per cent.

The lowest percentage is found in the large hickory nut (20 per cent.). The butternut and black walnut are also low. In comparing the Madeira nut (English walnut) with the butternut and walnut we find that it has about twice as much kernel. The two varieties of chestnut well illustrated the influence of cultivation and selection in improving our fruits. There is only a difference of 12.5 per cent. between the two kinds, but this is enough to make the ratio of shell to kernel 1 to 3 in one case and 1 to 6 in the other, or in other words, the shell of the Spanish chestnut has been reduced one-half.

From the comparative size of the two nuts one would think that there would be a greater difference in the weights of the kernels. Examination shows that the kernel of the large chestnut is not compact and solid like that of the small variety.

The sample of Brazil nut examined was very poor. The percentage of kernel is between 40 and 50.

The third examination represents the financial side of the question. The small boy with a burning nickle in his pocket and an unsatisfied appetite for nuts will find this information of great value.

The prices are recent market quotations. If we lay aside the peculiarities of individual taste and consider the matter from a true financial basis, we find that shell-bark hickory nuts at 2 cents a pound and walnuts at one cent a pound are the cheapest. Of the true commer-

cial nuts the peanut at 5 1-2 cents a pound is the most economical. Compare this nut with the pecan. The pecan sells for a half cent more per pound. The total bulk received for five cents is about the same in each case, but the actual value received is more than one-third in favor of the peanut. The most expensive nut is the almond at twelve cents a pound.

The two varieties of chestnut and Brazil nut furnish a good example of the point at issue. Each of these nuts sell for fifteen cents a pound. The chestnuts are superior by at least one-third. The selling price also makes the English walnut comparable with the almond. In this case there is a difference of about one-third in favor of the English walnut.

In the course of the investigation it was found that in cracking the larger nuts there is a "pulling" or cracking loss of about four per cent., about one-half of which is kernel.

Another fact brought out is that the pecan is painted and polished before being brought to the market. This adds much to the appearance. Other work in progress is the determination of the specific gravity. The true weight of a definite volume will also be determined, with the aim of establishing a legal weight. A chemical study concerning the food value of nuts is under way and the results will be presented in another paper.

Strawberries Under Glass.

Many fruits have been experimented with to determine whether or not they could be profitably grown under glass. The strawberry is grown this way in some places for the fruit, which goes to supply the mid-winter market. But a new idea has opened up in the east—the raising of strawberry plants for ornament and table adornment. C. E. Hann and L. H. Bailey, of Cornell University, have recently published a bulletin upon this subject. From this

bulletin we take the following points, which appeal with special force:

1. Very strong plants to begin with, which have been kept in vigorous growth, and not allowed to become pot-bound until they have reached six-inch pots.

2. Varieties which are early, or at least not later than mid-season, and preferably those which themselves produce an abundance of pollen.

3. The exercise of great care to have the plants free from fungous diseases and insects before they are put upon the benches.

4. The devoting of an entire house to the crop. If two or three different crops are grown in the same house, none of them can receive the very best treatment they demand; and if there are other plants in the house which are infested with red spider, the pests will spread to the strawberries and it is very difficult to dislodge them without keeping the plants so wet that pollination is interfered with and rot threatened.

5. Growing the plants as close to the glass as possible.

6. In the dull months, constant and careful attention to hand pollination.

7. Liberal applications of liquid manure two or three times a week after the fruits have begun to swell.

8. Exercise of care that the berries do not lie direct upon the soil or upon a wet surface.

"We are by no means confident that we have found the best methods of forcing strawberries. We give our experience for what it is worth, and desire to correspond with any person who can help us to better results."

The Relation of Forests to Farms.

E. B. FERNOW,

Chief of the Division of Forestry, U. S. Department of Agriculture.

That all things in nature are related to each other and interdependent is a common saying, a fact doubted by no-

body, yet often forgotten or neglected in practical life. The reason is partly indifference and partly ignorance as to the actual nature of the relationship; hence we suffer, deservedly or not.

The farmer's business, more than any other, perhaps, depends for its success upon a true estimate of and careful regard for this inter-relation. He adapts his crop to the nature of the soil, the manner of its cultivation to the changes of the seasons, and altogether he shapes conditions and places them in their proper relations to each other and adapts himself to them.

Soil, moisture, and heat are the three factors which, if properly related and utilized, combine to produce his crops. In some directions he can control these factors more or less readily; in others they are withdrawn from his immediate influence and he is seemingly helpless. He can maintain the fertility of the soil by manuring, by proper rotation of crops, and by deep culture; he can remove surplus moisture by ditching and draining; he can, by irrigation systems, bring water to his crops, and by timely cultivation prevent excessive evaporation, thereby rendering more water available to the crop; but he can not control the rainfall nor the temperature changes of the seasons. Recent attempts to control the rainfall by direct means exhibit one of the greatest follies and misconceptions of natural forces we have witnessed during this age. Nevertheless, by indirect means, the farmer has it in his power to exercise much greater control over these forces than he has attempted hitherto. He can prevent or reduce the unfavorable effects of temperature changes; he can increase the available water supplies, and prevent the evil effects of excessive rainfall; he can so manage the waters which fall as to get the most benefit from them and avoid the harm which they are able to inflict.

The regulation, proper distribution and utilization of the rain waters in arid

as well as in humid regions—water management—is to be the great problem of successful irrigation in the future.

One of the most powerful means for such water management lies in the proper distribution and maintenance of forest areas. Nay, we may say that the most successful water management is not possible without forest management.

THE FOREST WATERS THE FARM.

Whether forests increase the amount of precipitation within or near their limits is still an open question, although there are indications that under certain conditions large, dense forest areas may have such an effect. At any rate, the water transpired by the foliage is certain, in some degree, to increase the relative humidity near the forest, and thereby increase directly or indirectly the water supplies in its neighborhood. This much we can assert, also, that while extended plains and fields, heated by the sun, and hence giving rise to warm currents of air, have the tendency to prevent condensation of the passing moisture-bearing currents, forest areas, with their cooler, moister air strata, do not have such a tendency, and local showers may therefore become more frequent in their neighborhood. But, though no increase in the amount of rainfall may be secured by forest areas, the availability of whatever falls is increased for the locality by a well-kept and properly located forest growth. The foliage, twigs and branches break the fall of the raindrops and so does the litter of the forest floor, hence the soil under this cover is not compact as in the open field, but kept loose and granular, so that the water can readily penetrate and percolate; the water thus reaches the ground more slowly, dripping gradually from the leaves, branches and trunks, and allowing more time for it to sink into the soil. This percolation is also made easier by the channels along the many roots. Similarly, on account of the open structure of the soil and the slower melting of the snow under a forest cover in spring, where it lies a fort-

night to a month longer than in exposed positions and melts with less waste from evaporation, the snow waters more fully penetrate the ground. Again, more snow is caught and preserved under the forest cover than on the wind-swept fields and prairies.

All these conditions operate together with the result that larger amounts of the water sink into the forest soil and to greater depths than in open fields. This moisture is conserved because of the reduced evaporation in the cool and still forest air, being protected from the two great moisture-dissipating agents, sun and wind. By these conditions alone the water supplies available in the soil are increased from 50 to 60 per cent. over those available on the open field. Owing to these two causes, then—increased percolation and decreased evaporation—larger amounts of moisture become available to feed the springs and subsoil waters, and these become finally available to the farm, if the forest is located at a higher elevation than the field. The great importance of the subsoil water especially, and the influence of forest areas upon it, has so far received too little attention and appreciation. It is the subsoil water that is capable of supplying the needed moisture in times of drought.

THE FOREST TEMPERS THE FARM.

Another method by which a forest belt becomes a conservator of moisture lies in its wind-breaking capacity, by which both velocity and temperature of winds are modified and evaporation from the fields to the leeward is reduced.

On the prairie, wind-swept every day and every hour, the farmer has learned to plant a wind-break around his buildings and orchards, often only a single row of trees, and finds even that a desir-

able shelter, tempering both the hot winds of summer and the cold blasts of winter. The fields he usually leaves unprotected; yet a wind-break around his crops to the windward would bring him increased yield, and a timber belt would act still more effectively. Says a farmer from Illinois:

"My experience is that now in cold and stormy winters fields protected by timber belts yield full crops, while fields not protected yield only one-third of a crop. Twenty-five or thirty years ago we never had any wheat killed by winter frost, and every year we had a full crop of peaches, which is now very rare. At that time we had plenty of timber around our fields and orchards, now cleared away."

Not only is the temperature of the winds modified by passing over and through the shaded and cooler spaces of protecting timber belts disposed toward the windward and alternating with the fields, but their velocity is broken and moderated, and since with reduced velocity the evaporative power of the winds is very greatly reduced, so more water is left available for crops. Every foot in height of a forest growth will protect one rod in distance, and several belts in succession would probably greatly increase the effective distance. By preventing deep freezing of the soil the winter cold is not so much prolonged, and the frequent fogs and mists that hover near forest areas prevent many frosts. That stock will thrive better where it can find protection from the cold blasts of winter and from the heat of the sun in summer, is a well-established fact.

THE FOREST PROTECTS THE FARM.

On the sandy plains, where the winds are apt to blow the sand, shifting it hither and thither, a forest belt to the

windward is the only means to keep the farm protected.

In the mountain and hill country the farms are apt to suffer from heavy rains washing away the soil. Where the tops and slopes are bared of their forest cover, the litter of the forest floor burnt up, the soil trampled and compacted by cattle and by the patter of the raindrops, the water can not penetrate the soil readily, but is carried off superficially, especially when the soil is of clay and naturally compact. As a result the waters, rushing over the surface down the hill, run together in rivulets and streams, and acquire such a force as to be able to move particles, and even stones; the ground becomes furrowed with gullies and runs; the fertile soil is washed away; the fields below are covered with silt; the roads are damaged; the water courses tear their banks, and later run dry because the waters that should feed them by subterranean channels have been carried away in the flood.

The forest cover on the hilltops and steep hillsides which are not fit for cultivation prevents this erosive action of the waters by the same influence by which it increases available water supplies. The important effects of a forest cover, then, are retention of larger quantities of water and carrying them off under ground and giving them up gradually, thus extending the time of their usefulness and preventing their destructive action.

In order to be thoroughly effective, the forest growth must be dense, and, especially, the forest floor must not be robbed of its accumulations of foliage, surface mulch and litter, or its underbrush destroyed by fire, nor must it be compacted by the trampling of cattle.

On the gentler slopes, which are devoted to cultivation, methods of underdraining, such as horizontal ditches partly filled with stones and covered with soil, terracing and contour plowing, deep

cultivation, sodding and proper rotation of crops, must be employed to prevent damage from surface waters.

THE FOREST SUPPLIES THE FARM WITH USEFUL MATERIAL.

All the benefits derived from the favorable influence of forest belts upon water conditions can be had without losing any of the useful material that the forest produces. The forest grows to be cut and to be utilized; it is a crop to be harvested. It is a crop which, if properly managed, does need to be replanted; it reproduces itself.

When once established the ax, if properly guided by skillful hands, is the only tool necessary to cultivate it and to reproduce it. There is no necessity of planting unless the wood has been mismanaged.

The wood lot, then, if properly managed, is not only the guardian of the farm, but it is the savings bank from which fair interest can be annually drawn, utilizing for the purpose the poorest part of the farm. Nor does the wood lot require much attention; it is to the farm what the workbasket is to the good housewife—a means with which to improve the odds and ends of time, especially during the winter, when other farm business is at a standstill.

It may be added that the material which the farmer can secure from the wood lot, besides the other advantages recited above, is of far greater importance and value than is generally admitted.

On a well-regulated farm of 160 acres, with its four miles and more of fencing, and with its wood fires in range and stove, at least twenty-five cords of wood are required annually, besides material for repair of buildings, or altogether the annual product of probably 40 to 50 acres of well-stocked forest is needed. The product may represent, according to location, an actual stumpage value of from \$1 to \$3 per acre, a sure crop coming every year without regard to weather,

without trouble and work, and raised on the poorest part of the farm. It is questionable whether such net results could be secured with the same steadiness from any other crop. Nor must it be overlooked that the work in harvesting this crop falls into a time when little else could be done.

Wire fences and coal fires are, no doubt, good substitutes, but they require ready cash, and often the distance of haulage makes them rather expensive. Presently, too, when the virgin woods have been still further culled of their valuable stores, the farmer who has preserved a sufficiently large and well-tended wood lot will be able to derive a comfortable money revenue from it by supplying the market with wood of various kinds and sizes. The German state forests, with their complicated administrations, which eat up forty per cent. of the gross income, yield, with the prices of wood about the same as in our country, an annual net revenue of from \$1 to \$4 and more per acre. Why should not the farmer, who does not pay salaries to managers, overseers, and forest guards, make at least as much money out of his crop, when he is within reach of a market?

In regard to the manner in which the farmer should manage his wood lot, the Yearbook of 1894 gives a fuller account.

With varying conditions the methods would, of course, vary. In a general way, if he happens to have a virgin growth of mixed woods, the first care would be to improve the composition of the wood lot by cutting out the less desirable kinds, the weeds of tree growth and the poorly grown trees which impede the development of more deserving neighbors.

The wood thus cut he will use as firewood or in any other way, and even if he could not use it at all, and had to burn it up, the operation would pay indirectly by leaving him a better crop. Then he may use the rest of the crop, gradually cutting the trees as needed, but he must

take care that the openings are not made too large, so that they can readily fill out with young growth from the seed of the remaining trees, and he must also pay attention to the young aftergrowth, giving it light as needed. Thus, without ever resorting to planting he may harvest the old timber and have a new crop taking its place and perpetuate the wood lot without in any way curtailing his use of the same.

Extracts From the Recent Report of the Secretary of Agriculture.

The science of dairying is spreading from the Agricultural College centers, resulting in greatly increased and improved production. The Department of Agriculture is seeking markets in foreign countries by making their people familiar with the superiority of our goods.

We produce meats of superior quality more cheaply than any other nation can put them on the world's markets, owing to the cheapness of our grains and grasses. The State Experiment Stations are giving feeders information regarding the best methods of nutrition, which will result in more economic practices. The Department of Agriculture inspects live animals and dressed meats for export and certifies to their freedom from disease, supervises their condition through agents in foreign markets, and is the advocate of exporters where discriminations are laid upon the movement of live stock and meats in foreign countries. The Department will in the future endeavor to help producers to find markets for surplus productions, by getting and spreading information concerning them and concerning what foreign markets require.

There is a necessity in every foreign country to which we send representatives for American agents who have been educated in the sciences relating to agriculture. The agricultural colleges endowed by congress are educating men along these lines. Such men can now

be had who are competent to report intelligently on the productions of countries where man has lived by tilling the soil for thousands of years, and they could keep the farmers of the United States informed regarding crops, markets and their tendencies much more accurately than agents not scientifically educated.

The Department has a thoroughly competent corps of scientists occupying places in the front ranks of their specialties, conducting research into all fields of inquiry where practical farmers need their help. They co-operate with the scientists of the several experiment stations in investigations of more than local interest, and keep in touch with observers and experimenters throughout the United States and in foreign countries. Reports of their work are distributed as the secrets of nature influencing agricultural production are revealed.

Now, what has been done for the boy in agriculture and engineering needs to be done for the girl in domestic art and science. And already the beginnings of a far-reaching effort in this direction have been made. The teachers of domestic science are not content to follow a dull routine of household drudgery in their teaching. They are appealing to the scientist and specialist in lines which touch the home life to explain the principles on which home practices should rest and to show them how intelligent taste and skill can make the home a pleasant place to live in, and how scientific knowledge can enable the home keeper to maintain the health and generally promote the physical well being of those committed to her charge. Some progress has been made in formulating the replies which science is now able to give to inquiries relating to domestic science and in undertaking investigations with a view to greatly broadening our knowledge of these matters in the days to come.

Two principal lines of work carried on by the Biological Survey—a study of the geographic distribution of animals and plants, with a view to determining the boundaries of the natural life zones and their subdivisions, and the study of the food habits of birds and animals, for the purpose of ascertaining the economic relations of our native species. Work along both of these lines has been continued.

During the past fiscal year field work has been done in Washington, Oregon, California, Nevada, Utah, Wyoming, Nebraska, Kansas, Indian Territory, West Virginia, Mexico and western Canada.

A special effort has been made to ascertain the boundaries of the life zones of the various species of plants and animals in the northwest corner of the United States, particularly in Oregon and Washington.

Much time has been given, as heretofore, to the study of the water content of various soils, to determine the normal quantity in soils of different formations and of different agriculture areas as well as the normal variation which may occur in the water content without detriment to the plants. The importance and bearing of this work can only be really appreciated by seeing the relation of the soil moisture to the general economy of plant growth.

Under ordinary circumstances the temperature of the air is a prime cause of the evaporation or loss of water by plants; the relative humidity of the air, together with the general atmospheric movements, controls the evaporation, while the moisture of the soil supplies loss due to evaporation. For a steady and continuous growth of plants there

must be a certain relation therefore between temperature, which is the cause of evaporation, relative humidity, which is a controlling factor, and soil moisture, which applies to the loss. It has been possible to determine from the field records what may be called the line of drought for a number of the important soils of the country. This is the minimum amount of water which the soil must contain under ordinary conditions of temperature and humidity in order that the crop shall not suffer. This line of drought depends, of course, upon the texture of the soil as well as upon the temperature of the air, the kind of plant, and the stage of development. The texture of the soil has an influence on this, because in a soil of fine texture, made up mainly of clay and fine sand, the movement of water is quite slow, and there must be a large quantity of water in the soil to insure an adequate supply moving up to the roots of the plant to replace that lost by evaporation. This explains the well-known fact that a plant may thrive in one soil with 5 per cent. of water, while it would perish in another soil containing 15 per cent.

There is one economic question closely related to the general welfare of our future rather than our present which, I fear has not received adequate attention by our people or by congress—the forestry question.

It has become apparent that sooner or later a large line of manufacturing industries employing at present capital to the amount of more than one billion of dollars, employing labor of more than one million workers, and producing nearly \$2,000,000,000 of value annually, will be more or less hampered for lack of suitable supplies because of the absence of rational use and systematic reproduction of our forest resources. In addition, our agricultural interests in the hill country and mountain districts are bound to suffer, indeed, are beginning to suffer, from the same cause, just as they have suffered in other countries.

Bird Economics.

(JOHN F. CUNNINGHAM.)

I.

The time is coming, yes, the time has come, when some species of birds, at one time very common, are to be found no more upon the earth. They have passed in a short time into the list of extinct animals. One of the most prominent examples in this connection is the Great Auk, a wonderful bird which was once common in certain parts of the world. Very few, indeed, are the preserved specimens of this bird, and not a single individual of this species is known to be alive today. What has caused its disappearance? Unquestionably this great bird was flightless. Its breeding places were visited by fishermen and early voyagers, the birds were slain for their flesh, feathers and oil, and at last the species became extinct. Man in his greed does not look into the future, but sacrifices all to obtain a slight increase in his immediate returns. The same actions are taking place today, but in slightly different ways.

One of the greatest injustices to our birds, and indirectly to ourselves, and especially to those interested in agriculture, is the existence of bounty laws and the absence of laws protecting birds.

The families of birds most prosecuted unjustly are probably the families of the hawks and owls. To the average person "a hawk's a hawk" and of course if it is a hawk it is an enemy to the agriculturalist. Well, we all agree that a hawk is a hawk, but we will not agree that all hawks are our enemies; but on the other hand we do assert that many hawks and many owls are the farmer's friends, and should be protected.

We need hardly fear the quick extinction of these families of birds, but allowing for the good that they accomplish in keeping in check the increase of injurious rodents and insects, we think they should be allowed to live. Occasionally a hawk or an owl makes a habit of visiting the poultry yard at regular intervals and helping himself to one of our choicest birds. In this case we do not mean to raise a hand in his favor. He is then a nuisance and should be destroyed. But should all the family suffer for the unlawful actions of a certain number? We surely think not.

In the report for 1886 for Dr. C. Hart Merriam, Ornithologist and Mammologist, U. S. Department of Agriculture, he says: "On the 23rd of June, 1885, the legislature of Pennsylvania passed an act known as the 'scalp act,' ostensibly for the benefit of agriculture; which provides a bounty of fifty cents each on hawks, owls, weasels and minks killed within the limits of the state, and a fee of twenty cents to the notary or justice taking the affidavit.

"By virtue of this act about \$90,000 has been paid in bounties during the year and a half that has elapsed since the law went into effect. This represents a destruction of at least 128,571 of the above-named animals, most of which were hawks and owls.

"Granting that 5000 chickens were killed annually in Pennsylvania by hawks and owls, and that they are worth twenty-five cents each (a liberal estimate in view of the fact that a large proportion of them are killed when very young), the total loss would be \$1250, and the poultry killed in a year and a half would be worth \$1875. Hence it appears that during the past eighteen

months the State of Pennsylvania has expended \$90,000 to save its farmers a loss of \$1875. But this loss by no means represents the loss to the farmer and tax payer of the State. It is within bounds to say that in the course of a year every hawk and owl destroys at least a thousand mice or their equivalent in insects, and that each mouse or its equivalent so destroyed would cause the farmer a loss of two cents per annum. Therefore, omitting all reference to the enormous increase in the number of these noxious animals when Nature's means of holding them in check has been removed, the lowest possible estimate of the value to the farmer of each hawk, owl or weasel would be \$20, or \$30 in a year and a half."

Thus, without carrying these figures out any further, we see the great economic value of the hawks and owls in keeping in check our most annoying enemies. Below is given a table of the food of the hawks and owls of the United States. This table was compiled by the writer from reports sent in to the Department of Agriculture at Washington, and published in a special report on the Hawks and Owls of the United States. It will be seen that it is difficult, indeed, to draw the line between harmful and beneficial species. Dr. A. K. Fisher, however, in the report above mentioned, makes the following divisions:

(a) Wholly beneficial and wholly harmless—Rough-legged Hawk, Squirrel Hawk, Swallow-tailed Kite, White-tailed Kite, Mississippi Kite and Everglade Kite.

(d) Positively harmful—Sharp-shinned Hawk, Cooper's Hawk, Goshawk, Duck Hawk, the Gyrfalcons and the Fish Hawk.

All others would come in intermediate classes under the heads "chiefly beneficial," and "those in which the beneficial and harmful qualities seem to balance each other."

	Name	Number examined.	Containing poultry or game birds.	Containing other birds.	Containing mammals.	Containing reptiles, amphibians, insects, etc.	Empty
1	Swallow Tailed Kite. (<i>Elanoides forficatus</i>)	6	0	0	0	6	0
2	White Tailed Kite (<i>Elanus leucurus</i>)	1	0	0	1	0	0
3	Mississippi Kite (<i>Idina mississippiensis</i>)	4	0	0	0	4	0
4	Marsh Hawk (<i>Circus hudsonius</i>)	124	7	34	79	24	8
5	Sharp-shinned Hawk. (<i>Accipiter velox</i>)	159	6	99	6	5	52
6	Cooper's Hawk. (<i>Accipiter cooperi</i>)	133	34	52	11	6	39
7	Goshawk. (<i>Accipiter atricapillus</i>)	28	9	2	10	4	8
8	Harris's Hawk (<i>Parabuteo unicinctus harrisi</i>)	6	0	0	5	1	1
9	Red Tailed Hawk. (<i>Buteo borealis</i>)	562	54	51	409	106	89
10	Red Shouldered Hawk. (<i>Buteo lineatus</i>)	220	3	12	142	180	14
11	Zone Tailed Hawk. (<i>Buteo abbreviatus</i>)	5	0	0	0	4	1
12	Swainson's Hawk. (<i>Buteo swainsoni</i>)	18	0	0	7	14	3
13	Broad Winged Hawk. (<i>Buteo latissimus</i>)	65	0	2	28	60	7
14	Mexican Black Hawk. (<i>Drubitinga americana</i>)	6	0	0	0	6	0
15	Rough Legged Hawk. (<i>Archibuteo lagopus</i> , var.)	49	0	0	45	2	4
16	Squirrel Hawk. (<i>Archibuteo ferrugineus</i>)	1	0	0	1	0	0
17	Golden Eagle. (<i>Aquila chrysaetos</i>)	6	0	1	2	2	1
18	Bald Eagle. (<i>Haliaeetus leucocephalus</i>)	21	1	0	5	11	5
19	Prairie Falcon. (<i>Falco mexicanus</i>)	11	3	5	2	2	3
20	Duck Hawk. (<i>F. peregrinus anatum</i>)	20	7	9	1	2	4
21	Pigeon Hawk. (<i>Falco columbaris</i>)	56	2	41	2	16	5
22	Richardson's Merlin. (<i>F. richardsonii</i>)	4	0	2	0	1	1
23	Sparrow Hawk. (<i>F. sparverius</i>)	320	1	53	102	256	29
24	Audubon's Osprey. (<i>Polyborus cheriway</i>)	2	0	0	2	0	0
25	Fish Hawk. (<i>Pandion haliaetus carolinensis</i>)	12	0	0	0	11	1
26	Barn Owl. (<i>Strix pratensis</i>)	39	1	3	34	4	7
27	Long Eared Owl. (<i>Asio wilsonianus</i>)	107	1	15	89	1	15
28	Short Eared Owl. (<i>A. accipitrinus</i>)	101	0	11	84	7	14
29	Barred Owl. (<i>Syrnium nebulosum</i>)	109	5	13	64	32	20
30	Great Gray Owl. (<i>Scotiopteryx cinerea</i>)	9	0	1	8	0	0
31	Saw Whet Owl. (<i>Nyctala acadica</i>)	22	0	1	17	1	3
32	Screech Owl. (<i>Megascops asio</i>)	255	1	38	102	132	43
33	Great Horned Owl. (<i>Bubo virginianus</i>)	127	31	8	78	12	17
34	Snowy Owl. (<i>Nyctea nyctea</i>)	38	2	9	20	0	12
35	Hawk Owl. (<i>Surnia ulia caparochi</i>)	1	0	0	1	0	0
36	Burrowing Owl. (<i>Speotyto cunicularia hypogae</i>)	32	0	0	3	37	1
37	Pigmy Owl. (<i>Glaucidium gnoma</i>)	6	0	1	1	2	2
38	Elf Owl. (<i>Macropodias whitneyi</i>)	3	0	0	1	3	0
39	Totals	2698	168	463	1262	954	409

Creolin as a Disinfectant.

Much investigation has been carried on of late to determine the safest, surest and cheapest disinfectant for general use. Formaline, formol or formaldehydhe has been experimented with a great deal, and has proved both effective and convenient. Among other investigators Mr. F. Sidney Roop, Assistant Veterinarian at the Virginia Experiment Station has been investigating the properties of creoline as a disinfectant. His experiments are described in Bulletin No. 63, of this station. His conclusions are as follows:

"If laboratory methods can be relied upon to prove the disinfecting property of a drug, we may conclude from the above experiments that creolin, even in comparatively small quantities, is a true disinfectant.

In the above experiments the smallest quantity used, 1-2 per cent., did not, under the conditions, fail, after an exposure of five minutes, to either destroy the organism or render them incapable of further development.

We will give no theories as to the manner in which creolin acts on germs, but will say, should the action be a chemical one, that the amount of creolin required to act as a disinfectant will depend upon the number of germs that are present, and the temperature at which the action takes place—less creolin being required where the germs are few and the temperature high enough to be most favorable to chemical action.

Creolin is far less destructive to tissue than either carbolic acid or corrosive sublimate. I once kept one hand immersed in undilute creolin for five minutes, and on the following day, being unable to notice any change in the appearance of the hand myself, I asked two veterinarians and one human physician to

examine both hands and to tell me which one had been exposed to creolin. After a careful examination all three of them guessed, and one of the veterinarians and the human physician guessed wrong. Had this been either undilute carbolic acid or a saturated solution of corrosive sublimate, anyone could have told which hand had been exposed to its action.

Creolin has no more tendency to cause surgical instruments to corrode than has water, but it makes a white opaque emulsion in which the instruments cannot be seen by the operator.

In the veterinary hospital of the University of Pennsylvania, where nearly three thousand patients are treated each year, creolin is used almost to the exclusion of all other disinfectants, and antiseptics. In the veterinary hospital at this college we have used creolin to disinfect our hands, instruments, and the seat of the operation in quite a number of cases of ovariectomy in the bitch, and in no case has healing without the formation of pus failed to follow the operation. In some cases the stitches were removed as early as thirty hours after the operation, and the very best results followed.

Creolin is not an expensive disinfectant. It costs, in one pound packages, about fifty cents a pound, but can be had in five-gallon packages for about twenty-one cents a pound.

Creolin as a disinfectant and antiseptic is, for general use, one of the best.

The Charm of Birds.

When we think of nature and all her attributes what one more deeply impresses us or touches the sweetest thoughts of our souls than the joyful thoughts of the birds. With their clear, open throats, they strain their warbling notes into the joyful morn and their sweet sounds—pure and joyful thoughts—ring the hills and valleys and the air re-echoes the joyful tunes of sweetness. Many years ago Wordsworth sang the song of birds and has left this memento to their memory:

Books! 'tis dull and endless strife
 Come hear the woodland linnet,
 How sweet his music! on my life,
 There's words of wisdom in it.

And hark! how blithe the throstle
 sings!
 He, too, is no mean preacher;
 Come forth into the light of things,
 Let Nature be your teacher.

Sometimes, it seems, man is at war with the birds; especially has this been true of the past. The sweet songster of the air, it seems, has but few friends. His life has always been in danger. Little protection has been given him. His wants and safety and welfare have scarcely been studied. But thanks to a few generous people, he is being better taken care of today. His friends are doing all in their power to acquaint the great body of humanity with every songster about us. The bird literature being published is wholesome, pure and simple. It is our intention in this article to consider a few of the recent books on the birds. We are sure these books will be the easiest guide to our becoming better acquainted and better friends to these little air songsters.

The first book we pick up is a little volume, "The Charm of Birds," published by E. R. Herrick & Co., New York, and arranged by Rose Porter. It is unique in every respect. The author has selected from the writings of the English and American poets all the gems they have said about the birds. And such gems, too. The average reader hardly realizes the many choice things that have been said by our poets in their songs to the sweetest singers that nature has.

All through the book there's a charm of the birds,

"Like a sweet, melodious bird it sang,
 Sweet varied notes, enchanting every ear."

Bird Craft, by Mabel Osgood Wright, New York; the MacMillan Co. Price \$3. This charming volume is a field book of two hundred of our prominent song, game and water birds. It is handsomely illustrated with full-page plates, containing 128 birds in their natural colors. The author shows in this book her intimacy with nature. Keen and cultured observations of the birds in the fields and woods have taken place of gun and cage, to our delight. It is an admirable book with which to get acquainted with our common birds. The information given is well selected and to the point. The facts given are taken from the author's own careful observation and approved authorities. It is an inspiration to have such a companion for study and observation.

Bird Neighbors, by Neltje Blanchan, New York; Doubleday and McClure. Price \$2. This book gives in a popular and accessible form, knowledge which is accurate and reliable about our common birds. This knowledge is not taken from stuffed carcasses of birds in museums, but gleaned afield. In a word the short narrative descriptions treat of a bird's character, of size, color and flight; its peculiarities of instinct and temperament; its nest and home life; its choice of food; its songs. They are an attempt to make the birds so live before the reader that when seen out of doors their recognition shall be instant and cordial, like that given a friend. The work is handsomely illustrated with over fifty full-page plates in the natural colors of the bird. The work covers the characters and representatives of each family; the habitats of birds; seasons of birds; and description of each according to color.

Ornithology. By Nuttall. Two vol. Boston; Little, Brown & Co. Price \$7.50. This book is a popular handbook of the ornithology of Eastern North

America. It is a revision of Nuttall's famous work in which all the essential features of the great ornithologist's work are retained. While it is thoroughly scientific, the description of the habits and appearances of birds in the regions named is such that the general reader cannot fail to have his interest quickened and his knowledge increased. The illustrations, many of which are colored, are excellent, and together with the fascinating descriptions of our more common birds, make it one of the best books on birds issued. The original was an authority for years and the revision is even more available for the class of readers for which it was intended. Vol. I treats of land birds and Vol II of game and water birds. In bringing this work before the public, Mr. Chamberlain deserves the greatest praise for preserving the work of one of the masters.

Here is a neat little volume worthy a place in any naturalist's or sportsman's library. It is a book that will thrill with pleasure the soul of any one who loves to carry a gun and follow a good dog in search of game. It is called "Game Birds at Home," written by Theodore S. Van Dyke, and published by Fords, Howard & Hulbert, New York. Judging from the tone of the author and his every sentiment we can set him down at once as one of nature's noblemen. He says in the introduction that this book is not a Blood-snuffer's Manual, and no where in the book can there be found a passage that would encourage the ruthless slaughter of the wild game that our fields are blessed with. By reading a chapter in this book one is so drawn by it that he feels led along with the author through field and marsh, timber or meadow and he can see the dog working until he finds his birds, then he can hear the whistle of their wings as they rise and hear the crack of the gun as the sports-

man sends a shot after the fleeing child of the fields. The book is a veritable picture, and inspires the loftiest sentiments of the sportsman.

Here, too, is a book by the wellknown writer upon bird life, Mr. H. E. Parkhurst. This book is entitled "Song Birds and Water Fowl," and is published by Charles Scribner's Sons, New York. This is one of those books that carry you away and set you down among the trees and flowers, where, unseen by them, you watch the actions of the birds to your heart's content. The language of the book is excellent and the descriptions beautiful, in many cases sublime. The beauties of bird habits are worked out clearly and strongly and one is brought to love some trait in each feathered creature. The book is handsomely illustrated. The plates, in black and white, could not be better. They are true to nature.

As an example of the author's style we take the following brief sentence at random: "As diminutive as the albatross is mighty is the dainty petrel, whose spacious mansion of wide emptiness has the ocean for a billowy floor, the sky's blue concave for a vaulted roof, and for companions only winds and waves." This book deserves a place in the library of every one who sees beauty and grandeur in nature.

We now pick up an attractive work bearing the title "Sketches of Some Common Birds." It is written by P. M. Siloway and published by the Editor Publishing Company, Cincinnati, Ohio. This work is written in a pleasing style by one who has the power of elegant description and clear expression. It is a book for the popular mind, one that any one may read and be interested in. It leads the reader through the fields and woods, points out the peculiar habits of the different birds and tells of all their beauties. The work is well illustrated with full page plates in black and white. One feature we notice is the

great number of plates showing the young of many species. This is an unusual feature. In this book the birds are divided into artificial groups, such as meadow musicians, residents of the orchard, tenants of the hedge row, birds of the bushes, etc. It is an attractive book, and a good one for a young person to read and become familiar with.

Arboriculture and forestry are branches of agriculture and horticulture, and are subject to the same laws that govern the growth of other crops. As a rule we do not cumber our grain fields, orchards and gardens with inferior varieties of grain, fruit, or vegetables. We know it is bad economy. We try to raise the best. It is equally bad economy to allow dog wood, alder, red elm, black oak or other comparatively poor varieties to grow where yellow locust, white ash, catalpa, black cherry, hickory, black walnut or some other valuable variety can be grown with equal facility.

We should see to it that each acre that we control is producing the best paying crops, and that no acre becomes permanently poorer or remains useless.

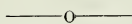
BOOK REVIEWS.

"Life History of American Insects," by Dr. Clarence M. Weed, New York. The MacMillan Co. Price \$1.50. A book in which the author, in a plain, simple manner, discusses in a non-technical way the life histories of a few of the most interesting American insects, their habits and their haunts. The book contains twenty-one full-page plates and a large number of small sketches illustrating the text. It is a helpful book to the non-professional student of nature. Not a book for study only, but each chapter to be read with increasing interest. It is thoroughly well written and well illustrated, meriting a place in every home library.

"The Lattimers," by Henry Christopher McCook, Philadelphia. George W. Jacobs & Co. Price \$1.50. This is one of the best historical novels the writer has had the pleasure to read. It is a tale of the Western Insurrection of 1794, while the historical points are fairly true to history, the chief value of the book lies with the romantic idea. We know of no other author who has so well pictured the life of the Scotch-Irish pioneers as Dr. McCook. This vigorous stock of people have been the chief pathfinders of our then western border. This work has thrown a brilliant light upon their history in the formation era. In prosecuting his purpose, the author had diligently studied his people, their habits, characteristics and environment. Local histories had been read. The dialect had been especially studied. We believe it is right to say, in every respect, the author has given the reading public a description of a people that is true to their characteristics, and as interesting as their eventful lives have been daring and exciting.

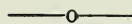
"Thro' Lattice Windows," by Dr. W. J. Dawson. Doubleday and McClure Co., New York. This interesting little book gives a picture of English village life—character sketches—which, for their intimacy, realism, sympathy and fine feeling are quite as remarkable as any of the so-called "Scotch School" products. Several characters reappear through the book in different tales, helping to complete the illusion that the reader is actually living among the homely villagers. It is a work to be admired for its beauty and clearness of description, its tenderness and simplicity. It is written in clear English and its greatest merit is in reproducing the scenes and expressions among the villagers without introducing the difficult dialect. The impression of some parts of the book seem to be an endeavor to bring tears, but the scenes are very touching and the colors well laid.

"Cupid and Croesus" and "R.S.V.P." by Charles Didier, Baltimore. Williams and Wilkins Co. Rarely do we find among novelty books two such choice ones as "Cupid and Croesus" and "R. S. V. P." They are very handsome presents for any occasion. They are profusely illustrated by pen drawings by the author; and from an artistic standpoint the author and publishers have given us two books that surpass anything of the kind we have ever seen. They can be obtained from the publishers or any book stores.



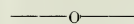
"Freedom of the Fields," by Dr. Charles C. Abbott, Philadelphia. J. B. Lippincott Co. Price \$1.50. Dr. Abbott is a nature lover. He tells us about nature because he is full of it. Those who have read any of his previous works will hail "Freedom of the Fields" with delight. In this little volume we have an autobiography of the author. His meditations tell us of himself. The book is made up of fifteen short essays, describing the simple record, as the author calls it, of his later days and doings. The writer has read with the deepest interest every one of these "meditative sketches." They contain a rare poetic beauty and are full of happy suggestions.

"An April Day Dream," "The Changeful Skies," "Passing of the Blue Bird," "An Apathetic August," "A Forecast of Autumn," "Indian Summer," "The Effects of a Drought," "Winter-green," "The Witchery of Winter," "Company and Solitude," "Overdoing the Part," "Dreaming Bob," "Winkle," "The Eel Man," "Windfalls" and "My Neighbor's Wood Shed" include the title of the several subjects.

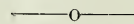


"Nature in a City Yard," by Charles M. Skinner, New York. The Century Co. Even in so small a place as a city

yard can nature be studied. In this little volume, "Nature in a City Yard," Mr. Skinner tells about standing in his own yard and the many things he has seen there. Overhead the sky, with all its variance, has received his earnest and constant attention. The author has also, in his clear and philosophical style, given us his ideas of "Country and City Life," His thoughts on "Winter," "Spring," "Summer," "Autumn," "Flowers and Insects" and "The Soul of Nature." The author, in his little book, describes nature and her creatures as they are shown and revealed to him in the seasons when most prominent. And he has done it admirably, too. It makes one of our choicest volumes of nature sketches.



"How to Know the Wild Flowers," by Mrs. William Starr Dana, New York. Charles Scribner's Sons. Price \$1.75. This book is a guide to the names, haunts and habits of our common wild flowers. Over 450 varieties of wild flowers are described in a simple, brief, clear manner that make them easily recognizable. It is nicely illustrated with 152 illustrations. The romantic, legendary, literature and other associations of each are referred to in a pleasant style, giving the book a value for the library as well as for the field. It is a most suggestive work. With its aid one can find in country places an intelligent joy. For in it you have a companion that can tell you a thousand things of the greatest value and pleasure. By its aid we are able to name our wild flowers without analyzing them.



"The Science of Nutrition," by Edward Atkinson. Published by Dammell and Upham, Boston. Price \$1. This book is a very practical handbook for the housekeeper and domestic economist. It is written by a strict economist who is assisted by an able corps of writers upon special subjects. Dietaries are carefully computed under the direc-

tion of Mrs. Ellen H. Edwards. The Aladdin oven, a new method of cooking, is described and the directions for its construction are given. Tests in the slow methods of cooking in the Alladin oven have been made by Mrs. Mary H. Abel and Miss Maria Daniell; these tests are described and instructions and recipes are given. The nutritive values of food material are collected from the writings of Prof. W. O. Atwater. To the book a valuable lot of letters and reports are appended. A great saving can be made by following the instruction given in this work, and it is recommended to housekeepers, domestic economists and teachers.

Some Greenhouse Pests.

(JAMES S. HINE.)

A study of insects observed injuring plants in Columbus greenhouses during the past two or three years, has been productive of results which I shall give to the members of the society at this time. In the following pages I shall discuss five or six species which I find to be more or less troublesome under glass and, with two exceptions, to outdoor gardens also.

Phlyctaenia ferrugalis Hbn.

Order Lepidoptera; Family Pyralidae.

This species is a serious pest in the greenhouses of Columbus, and, according to *Insect Life*, Vol. II, p. 227, one "which has long been known to feed upon greenhouse plants." Its life history was very carefully worked out in England by William Buckler and published by him in the *Entomologists Monthly Magazine* for 1878. At that time the larvae were found feeding upon various weeds and one specimen was observed feeding upon strawberry leaves.

In the *Canadian Entomologist* for 1877, Grote describes *Botis harveyana*, which by later students has been considered synonymous with *P. ferrugalis*. Grote mentions that his specimens were

secured in New York and Texas, but made no reference whatever to food habits of the larvae.

The description referred to above is the earliest record I have seen of the occurrence of the moth in America; but at the present time it has a wide distribution over Ohio and other states and has been reported at least as far west as Chicago. It doubtless belongs to the fauna of the whole of eastern United States.

In Bulletin 102, of the Michigan Experiment Station, a new phase in the life history of *P. ferrugalis* is mentioned. Mr. G. C. Davis, the author, names the larva "the celery borer," and records observations upon it as a celery insect at Kalamazoo, Michigan.

During my acquaintance with the larvae, I have never seen anything that would justify calling it a borer, but have found it to be an injurious celery insect, especially to the leaves of young plants before they are transplanted into permanent beds. They seem to thrive best in thick growing vegetation, where there is plenty of shade.

LIFE HISTORY.

The eggs of the species are placed singly on the under surface of the leaves of food plants. These eggs are light, almost white in color, and are seen with difficulty on most plants. They hatch in about five days, producing larvae 1 1-2 mm. long, and milk white, with a large black head. The larva molts first in eight days and at intervals of about five days thereafter until it has molted four times. In eight days after the fourth molt it has become full grown and is ready to pass to the pupa stage. It now makes for itself a retreat by turning over the edge of a leaf—sometimes by drawing two leaves together—and fastening it securely with silk. Here

it pupates once, and in the course of a week or so the moth makes its appearance.

DESCRIPTION.

The full grown larva is nearly an inch in length and its general color is light green, but there is a dark dorsal stripe, bounded on either side by light, which finally merges into pure white. Beyond the white there is an obscure, yellowish green lateral stripe. The head and thoracic shield are drab, with oftentimes a pinkish tinge. The latter has two black points placed well forward and at the sides. It is smaller towards each end, but more markedly so towards the head, and is sparsely clothed with long, pointed hairs.

The pupa is of the usual dark brown color so common to the pupae of various insects.

Grote described the moth as follows:

"A small species, more slender than communis, with pale brown primaries, the exterior line fine, blackish, absolutely denticulate, rather suddenly drawn in at vein two, thence back again and angulate before the margin. Outer spot large, annulate. Inner spot obsolete. Before the fringes, which are faintly interlined with pale and are discoloured, there is a distinct sinus of dark points. Hind wings paler than the primaries, washed outwardly with the same brown as the primaries, with a distinct discal dot and median line. Beneath more ochreous, with the discal dots double on the hind wings; a common exterior line; on the primaries the veins are partially darker marked; terminal points very distinct and continuous. Head, palpi and thorax above pale brown, beneath concolorous, with the under surface of the wings glistening. Expanse 18mm."

INJURY IN GREENHOUSES.

I have found that the time required for *P. ferrugalis* to pass through the different stages of its existence in the greenhouse requires about six weeks, so it is evident that at least five generations are produced in the interval between the middle of September and the middle of the following May, or the time during which most commercial greenhouses are in operation.

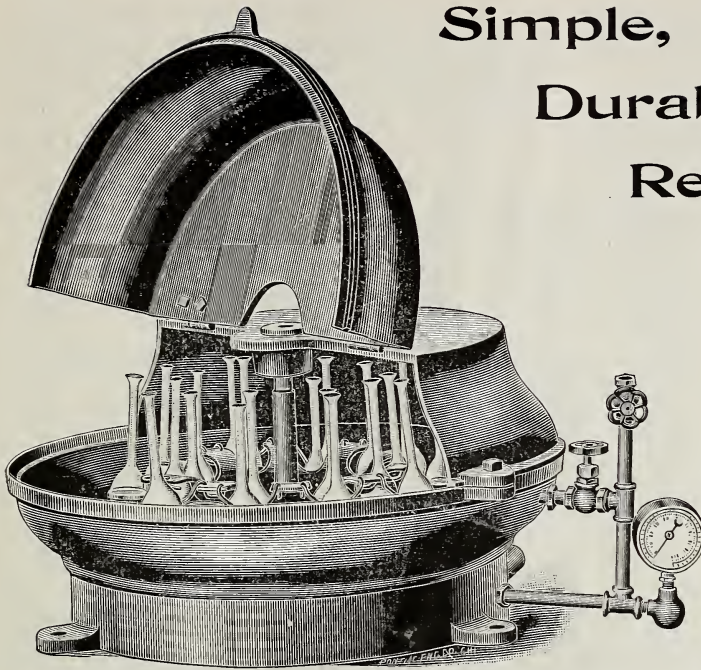
A few eggs or other stages, carried in on plants in the fall, are capable, under favorable circumstances, of increasing to vast numbers in five generations, and in consequence a great deal of injury is the result. This explains the condition of affairs in some Columbus greenhouses upon the appearance of spring.

The young larvae begin feeding by eating small pits and furrows in the underside of the leaves. While doing this they simply cling to the leaf surface without any protection.

Larger larvae protect themselves by drawing leaves together and fastening them with silk. In these retreats they either skeletonize or eat large holes in the foliage, greatly disfiguring its appearance, to say nothing of the injury to the plants themselves.

Where this species gets established in greenhouses and becomes numerous it makes sad havoc among almost all kinds of plants. According to my observations, *ageratum*, and *heliotropes* are preferably attacked, while *geraniums*, on account of the number grown, suffer most from its ravages. The larvae have been found feeding upon *chrysanthemums*, *begonias*, *abutilons*, *roses*, *pelargoniums*, *cinerarias*, *nasturtiums*, *moonvine*, *swinsonia*, *genista*, and a number of other species and varieties.

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Dayton & Cincinnati..	* 7:15am	* 9:55pm
Ind'napolis & Chicago	* 7:15am	* 9:55pm
Dayton & Cincinnati...	† 9:25am	† 6:30pm
Local to Cincinnati...	† 9:25am	† 6:30pm
Dayton & Cincinnati...	†12:50pm	† 4:05pm
London & Springfield..	†12:50pm	† 4:05pm
Dayton & Cincinnati...	* 2:25pm	*12:25pm
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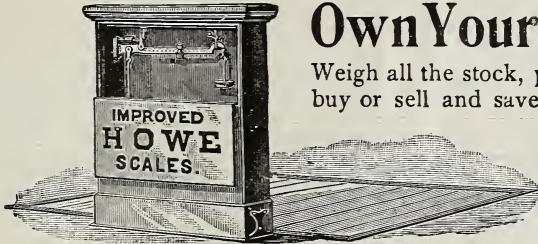
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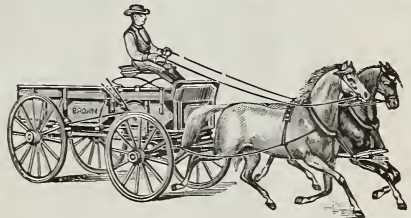
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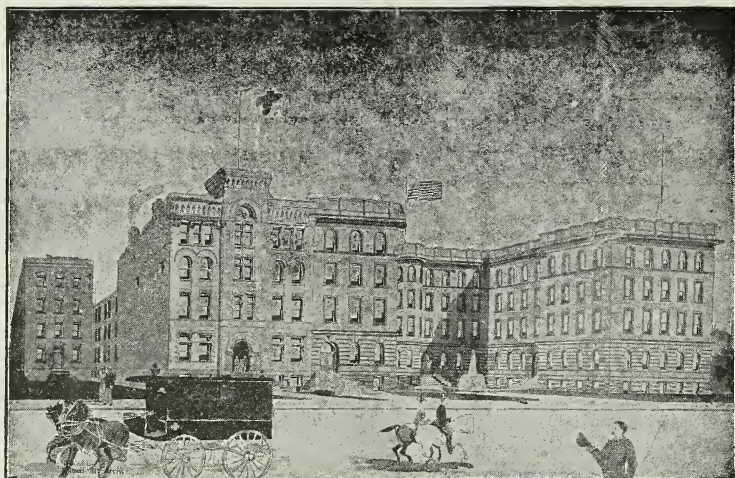
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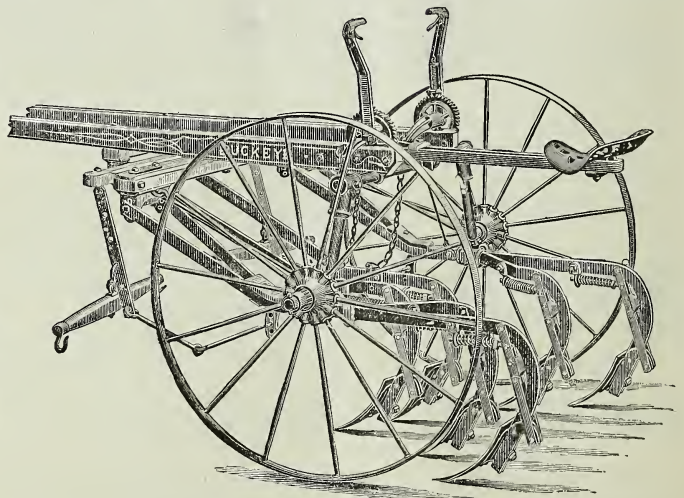
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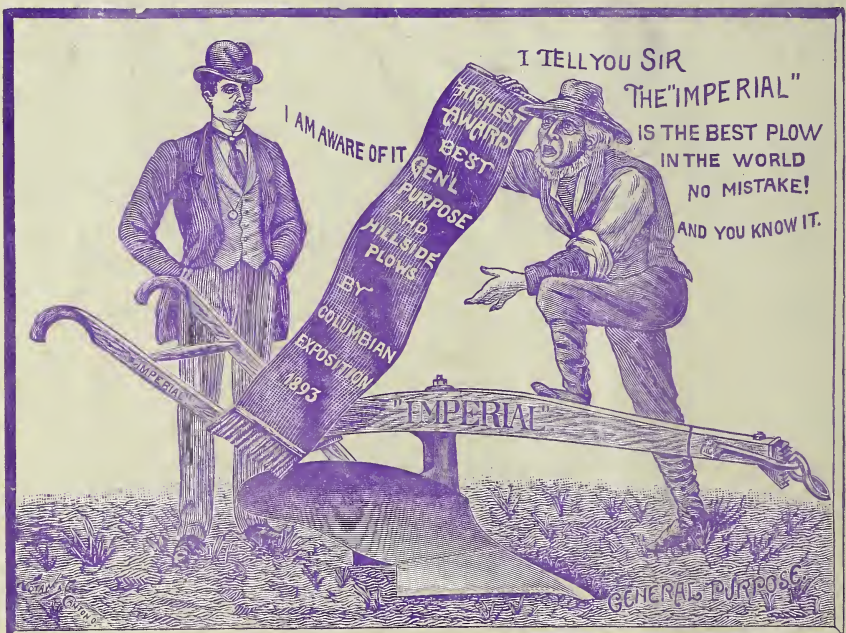
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